SUPPLEMENT.

The Mining Journal,

AILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

. 1658.—Vol. XXXVII. LONDON, SATURDAY, JUNE 1, 1867. {STAMPED .. SIXPENCE. UNSTAMPED. FIVEPENCE.

LECT COMMITTEE ON ASSESSMENT OF MINES, WOODLANDS, &c., BILL.

t—Mr. Percy Wyndham (in the chair), Lord George Caven-rd Eustace Cecil, Mr. Kendall, Mr. Leeman, Mr. Knatch-gessen, Mr. Colvile, Mr. Beach, Mr. Villiers, Mr. St. Aubyn, ter-Booth, Mr. Read, Mr. Liddell, and Mr. Henderson.

AVEY, M.P. for West Cornwall, was the first witness (exa-y Mr. St. Aubyn). He said he had lived in Cornwall all his had been largely interested, both as lord and as an adven-mines for the last fifty years. He had seen the Bill now before the e, the object of which was to render the mines liable to local rates, and s provisions occupiers will be liable to be rated on their property in the he present condition, speaking generally, of occupiers or adventurers all or Devon is frightfully bad, not only from the poverty of the mines, the great depression in the prices of both tin and copper, the latter to stagnation of trade, caused by a great increase of the tin and copper ; consequently, they are not in a position to bear the additional burthen on them by this Bill as it now stands, which will be the means of stop-eat many of the mines.

AUBYN: Mr. Lumley, the Secretary to the Poor Law Board, has stated s Committee that if this Bill passed, in addition to whatever rate might on the lord on account of his dues, the adventurer would be liable to n the ore raised, and on the value of his fixed machinery and buildings. ive any examples within your own knowledge to illustrate the work-s enactment?—Yes; I have gone through this Bill, and, as I under-I have just drawn out a sketch of its working, which, if you will allow read. A mine to pay 500*l.* dues would raise in produce 10,000*l.*, taking ge royalty at one-twentieth, which I presume to be near about the ere will be two assessments; the dues must be deducted from this which would leave the amount 9500*l.* The plant of a mine of this de-may be laid at 6000*l.*, making 15,500*l.* Assuming that one-third is or the corpus, that would be 5100*l.*, leaving a rateable value of 10,400*l.* s generally in mining parishes now may be estimated at from 3s. to 1*l.*; but I will assume, again, that other properties will be rated by-I will, therefore, make a reduction in the amount of the rate, and say That would leave for the adventurers to pay 1040*l.* Out of this the can only deduct one-half of the rate payable—that is, the royalty being ar, assuming the corpus to be one-third, that would be 166*l.*, leaving a f 334*l.* to be rated at 2*s.* That would give 33*l.* The half of that would nly to 16*l.* 10*s.* out of the 1040*l.*, and all this without any beneficial and while there were no profits from the mine.

. AUBYN: Can you mention any mines where such a state of things brought about if the Bill passed?—Yes; a very large copper and tin the parish of Gwennap, called the Clifford Amalgamated, where they raise now some 4000*l.* worth per month, and to be rated in this way row such a burden upon them that they would sink under it, and be stop, and throw a great number of hands out of employment.

LLIERS: Have you calculated what that mine would be rated at on the amount paid in that parish?—The amount of the produce would be -year. Then you have to deduct from that, upon the same principle e done before, for the corpus, and, after taking a third off for that, lander would become rateable to the parish. In this particular mine paying one twenty-fourth part dues, not in kind, but in money. This "calling" mine—that is to say, they are obliged to make calls to aid duce in meeting the cost. A large proportion of the shareholders live n, and if any further burden were put upon them they might relinquish res, and the mine would have to be abandoned. It has been a good d paid a dividend until the reduction in the price of metals.

LLIERS: If I understand you rightly, the burden of the poor-rate under would be such that the mine would stop?—Yes.

LLIERS: Under those circumstances would not owners prefer to take a of the burden, or, at least, make a fresh arrangement with the company quence of the fresh burden laid upon the mine?—The amount of rate upon that one twenty-fourth would be so trifling that it would not be any compensation that they might require. In many cases the rates double the amount of the dues.

LLIERS: Is there any prospect of improvement in the trade?—There is pect, that there is less coming from abroad at this moment, in conse-the very low price. I believe that, at a certain higher price, the quan-rted would be so very large that it would stop every mining company nty—therefore, you could not expect to have a very high price for it, ight have such a price as would be too low for them, and pay our miners ng. I have seen many changes in that way, and the mining interest, it is now, probably worse. Most people in Cornwall are in favour of nes to a certain extent—that is to say, they would have no objection alty being rated, allowing a certain sum for the corpus; but it would bjectionable for the produce to be rated, or even the profits. The pro-ated already to the income tax. Rates are felt to be very heavy in arishes, and I, therefore, do not object to mines bearing a certain pro-of the rates. If I am correct in my calculation (given above), 1000*l.* pay for a small mine would be a considerable sum, and very unfairly on the occupiers. There are some cases in which people work their r the purpose of keeping their miners off the parish, and others where t in hopes of better times. Just at this moment there are many more " mines than there are profitable mines.

. AUBYN: Are you acquainted with the Wheal Agar Mine?—Yes; the pent in that mine is above 90,000*l.*, and they have never had a sixpence . It is working now.

. HENDERSON.—In my first illustration I based my calculation upon the ue of the produce received. The 10,000*l.* includes not only the amount yalty (500*l.*), but all the labour and expense of bringing the produce to ce. The average value of copper is now 4*l.* 10*s.*—the lord's due on that, eth, would be 4*s.* 6*d.* If the lord's dues are taken as the basis there no particular fault to be found with this Bill.

. KENDALL.—I do not at all object to rating the mines upon the royalties I have always had the opinion that the dues ought to be rated. The eeling amongst the landed proprietors in Cornwall is a willingness to burden upon their shoulders. I have spent hundreds of hours under-and am still an adventurer.

NDALL: I ask you, as a miner, whether or not you would now with pany undertake any grant to work any mine in Cornwall, however ou were to pay rates according to the Bill now before this Committee?— not; I should think it was a bad speculation, and repudiate the whole —Do you know of a large mine which has stopped lately?—Yes; Great ey, which has just ceased to work after losing 90,000*l.*, and the St. ed Mines, where they have lost 60,000*l.*, and have within the present ased to work. If this Bill passes the whole thing will be given up as se. We shall be entirely dependent upon foreigners for ore, and in ar, either with ourselves or in the countries from which it is brought, top the supply, all the smelting-works must cease to work. The Cornish re not fit for anything except mining, and they would be reduced to poverty.

BEACH.—In working a mine the royalty has nothing to do with the t only with the produce. The occupiers work the mine, paying the greed upon, but whether they make a good thing or a bad thing of s upon other circumstances. They take it hoping to make a profit, but just mentioned, in which the adventurers have paid 90,000*l.*, and not ingle sixpence of profit, is not an unusual one.

AIRMAN: Are you not aware that this Bill, except in cases where the w paying part of the rate, would have the effect of bringing the rates occupier?—Yes.——Would you prefer that, as a principle, to the lords ed?—No; as I said before, I should prefer that the royalty should be ead of the produce. It is a better principle of rating, and it is but the lord, receiving his dues without any risk, should be burdened with —the adventurers, who have all the risk, not gaining very often a six-remuneration.

VILLIERS.—There are cases in which the lord remits the royalty alto-I have a mine of my own from which I have not received any dues for our years. I was obliged to pay rates on the dues though I never re-em.

CHAIRMAN.—The royalties vary much in the case of mines of the same value. There are cases in which it varies between 4*d.* and 1*s.* 6*d.* per ton in the same parish when the value of the two mines is equal.

The CHAIRMAN: It would hardly be fair, then, to take the royalty, under those circumstances, as the basis of the rate?

Mr. HENDERSON: You used the words "the poverty of the mines;" is that applicable to all of them?—To the greater part.——That looks very much as if the supply was worked out?—We have always been for many years making discoveries, but it has not occurred during the last three or four years that there has been a discovery of any consequence. In that time no new mine has been started. A large number of Cornish miners have ceased to work in the mines there, and have either emigrated to Australia or Canada, or have gone to the North of England.

Mr. LEEMAN: Assuming a case in which, from any circumstances, the royalty originally reserved should become inadequate to represent the real value of the mine, would there be any difficulty in rating upon the increased royalty, less any value given to it by the plant and machinery?—All leases are for 21 years, and what is in a lease the adventurers are bound to pay, and I do not see why a fresh arrangement should be made during that lease.——Supposing the case of a lease of a farm at 100*l.* a year rent, improved by the tenant until the assessment committee may think the rate should be on 150*l.*, and rate accordingly, would there be any difficulty in applying the same principle to a royalty of a mine?—Of course, both may be assessed on the same principle.

By Mr. ST. AUBYN.—In Cornwall there is no fixed royalty, it is always a certain proportion of the produce.

By Mr. LIDDELL.—In the event of this bill being passed, I should recommend that in future the rate should fall upon the owners of mining property, and not upon the occupiers.

By the CHAIRMAN.—The royalty varies with the amount of produce raised; and the amount of produce raised in a year is no safe guide as to whether the mine is paying well or not, because when iron or tin are paying best less ore may be raised than at other times. It depends entirely upon the prices whether it pays to raise more or less.

The CHAIRMAN: By a provision in the Bill the occupier would never be allowed to deduct from the lord more than half the sum charged upon him; and that being the case, do you think it would be a hardship upon the occupier to have to pay upon what was the real value of the mine at that particular time instead of his being allowed to pay upon the royalty that might have been fixed many years ago?—Assuming the case I gave just now, of dues amounting to 500*l.*, then he would have to pay rates upon 1000*l.*—that is, double the amount of the dues; in that case all the occupier could get back from that would be 16*l.* 10*s.*, taking the half of the rate on the royalty paid by the occupier.

Mr. HENDERSON: Do you in your calculation assume not only that the rate is upon the profits, but upon the gross value of the produce?—If I understand the bill aright, I have given you a correct statement of its operation.——What part of the bill has led you to assume that the value of the gross annual produce is to be rated, because that is a very large sum indeed?—I have taken it from the evidence of Mr. Lumley.

Mr. VILLIERS: There is nothing in the bill which would lead to that conclusion?—As far as the bill goes, it states only that all mines shall be rated: but Mr. Lumley's evidence says that all mines should be rated upon the full produce, as well as the plant.

Mr. VILLIERS: I think your evidence will be mistaken if it is to go forth that you, looking at the bill, consider that the mines in Cornwall will no longer be worked if the bill is passed, for there is no provision to rate the gross annual produce as you imagine. It is an inference from something said by a witness whom you did not hear give the evidence?—That was the evidence as it was given to me, and as it has been read here.

Mr. JOHN TAYLOR (examined by Mr. Kendall) said he was brought up as a miner, and had been connected with mining all his life. He was superintendent of many mines, both as an adventurer and manager, for himself and partners, in the North of England, North and South Wales, Derbyshire, Devonshire, and Cornwall. He agreed with Mr. Davey's evidence as to the effect of any fresh burdens on mines. He could not think of any other than the royalty or dues, or fixed rents, as a fair basis upon which the rating could be made. That was the true rent of the property, and any other plan would be liable to great frauds and difficulties. I find it extremely difficult to imagine or to contrive any plan of assessment excepting that based upon the royalty. I understand that the desire would be to rate the occupier for the beneficial interest the annual benefit arising out of the mine. I cannot see how any assessment committee could arrive at a fair value upon which to place that rating, and I cannot, looking at other properties, satisfy myself that it would be just or equitable that a new burden of that kind should be imposed upon mines. If any extra burden were now placed upon the tin, copper, and lead mines of Devonshire and Cornwall it would close a large number of them. I can speak from my own experience. I have the management myself of a large tin mine on the north coast of Cornwall, which is leased from the Duchy. We have lost money for the last two years, but had happily accumulated a reserve fund, upon which we have drawn, and we have now spent the whole of it. We have had that reserve fund invested in railway debentures, and the last of them is sold, and we are now reduced to the value of the plant. We are speculating a little; we are spending, in fact, a portion of the value of the plant. The mine is kept at work, I will not say without any hope of finding better markets and improved times, but mainly to keep our people employed, and to keep them together.——That is an element in your considerations?—Yes; it would deprive nearly the whole of a parish of employment if the mine were to stop; and if we do not see better times in a twelvemonth more we must stop. Any fresh burden thrown upon us, even to the extent of 300*l.* or 400*l.* a year, would unquestionably stop us. That is a case where the Duchy has for the moment entirely abated and given up all dues.

By Mr. KENDALL.—What would be the effect in the case of a war between Chili and England?—Very serious, indeed. Chili is the country which produces copper most largely of any country in the world. Tin is most largely produced, otherwise than in Cornwall and Banca; those are the sources from which we derive the antagonistic quantities which have played the mischief with our markets. I do not take an extremely depressed view of the state of mining enterprise. I have no faith that those prices would have arisen but from the extremely bad state of the commerce of this country with the East, with India, China, Japan, and those countries, which has deprived us of a large portion of our usual markets. At the same moment it has so occurred that the mines of Chili have become enormously productive of copper. The Government of Holland, too, for some reasons best known to themselves, have poured a larger quantity of tin into the markets than we had ever seen before. All these circumstances combined, the bad markets, the want of trade here, the enormous check to the consumption of copper, owing to the bad state of the railways, have produced the effects I have referred to. With regard to the last point, perhaps the committee may not know the connection between railways and the price of copper. Every mile of railway requires a locomotive and tender; every locomotive and tender take 2 tons 12 cwts. of copper. In the last year or two, perhaps, the proportion in England actually may be 10 miles of railway for one locomotive and tender, and there is not one railway anywhere that is not ordering less than they ought to do. None of them are keeping up their plants to the extent of their requirements, owing to temporary circumstances, which will pass away, and we shall have an increased consumption of copper again. Chili now produces more than one-half the copper of the world, and the consequence of a war with Chili or America would be that no Chilian copper would come to England. If there were war with America, it would not only play the mischief with our smelting trade in copper, but with our manufacturing trade in copper, which is now enormous. Besides, the effect upon the mines would come too late; the mines would be shut up. Many of them are 200 or 300 fathoms deep, and would all be full of water. We shall all be done for long before all these results can come about. If we are rated severely we shall never survive. And these mines will never be pumped out again; they are not rich, or good enough even to pay for the cost involved in pumping out the water. I do not mean to say that there are not other portions of Cornwall that will not produce. I dare say that may be the case, but they have been pretty well sought and tried, and there is not much chance.——What would it cost, if the Clifford Mines were stopped, and you wanted to re-open them, to pump the water out?—You would never see the bottom of these mines under 120,000*l.* or 130,000*l.*, at least; probably 150,000*l.* It is very much the same with the great collieries at Newcastle; they would never see the bottom of them under a large outlay of that kind—150,000*l.*, at the very least, considering the large areas affected by water.——It amounts to this, that you must deal very tenderly with the Cornish mines if you do not wish to stop them altogether?—I do not advocate tender dealing with anybody upon a ground of that kind; I only put it upon the broad ground of settling the assessment upon an equitable plan, by which they would be rated upon what they could really bear. We have mines in England that will bear rates. Rate them if you please; but there are other mines, those in Cornwall, for instance, that cannot bear rates at present, and they would be severely punished if you tried to put them on. They would stop, and you would have a large number of people out of employment. Besides, in mining parishes there are a large number of old people.

Mr. READ: Do you object to the general principle of rating mines?—No; I have always been an advocate for it. The distinction of rating mines where the royalties are paid in kind, and not where they are paid in money, is an absurdity not based upon any principle of equity. I look upon the royalty in the light of a rent precisely—the average annual value of the mine.

Mr. EDWARD MILLER WASS (examined by Lord George Cavendish) said he was engaged in mining in Derbyshire, and was well acquainted with the mining customs and tenure there. The lord is rated upon the dues. In many districts (that of Wirksawork for instance) there are many very small mines worked by sets of three or four men, who are content if they make 10s. or 12s. a-week out of them. It was surprising that they would continue to work for such a small result, but the lead miners become so attached to their mines that they will not leave them. He quite agreed with the other witnesses, that the only fair thing would be to rate him who alone derives any benefit (in the case of Derbyshire certainly) from the mines—that is, the lord, who is now rated. Throughout the whole of Derbyshire mining was a disastrous enterprise—a losing affair. There should be no rating if there is no beneficial occupation.

Mr. ROBERT HUNT, F.R.S., was then examined by Mr. St. Aubyn.—I was formerly a professor of physics in the School of Mines, and am now Keeper of the Mining Records in the Jermyn-street Museum. I am well acquainted with practical mining, and with Cornwall, having lived for many years in that county, and since 1839 been officially connected with it. For six years I was secretary of the Royal Cornish Metallurgical Society, and for the remaining period Keeper of the Mining Records, which has constantly occasioned my intercourse with Cornwall. In March and April of this year I was six weeks in the county, and visited the mines of Cornwall and Devonshire, with the special view of obtaining accurate information, for official purposes, with respect to the condition of those mines. Nothing can be conceived in a more disastrous condition than Cornish and Devonshire mining at the present time. It is worse than it has been at any other time since 1839. The mines actually at work in 1861 were 543; in 1864 the number rose to 616, but in the months that I was in the county in 1867 they fell to 320. The number of dividend-paying mines in 1861 was 58; at the end of 1866 there were 26. The amount of the produce of the mines within the Stannaries in 1861 was 180,778 tons of copper ore, having a value of 1,004,915*l.* In 1866 there were produced 138,141 tons of ore, having a value of 582,564*l.* The produce of the ten mines in 1861 was 10,963 tons of ore, having a value of 793,698*l.* In 1866 there was produced 15,080 tons of ore, having a value of 754,000*l.* In 1861 there were in Devonshire 2364 miners above 20 years of age, and in Cornwall 19,159, making a total of 21,523 miners of and above the age of 20. Within the last 18 months 7380 miners have left Cornwall and Devonshire, and 11,321 have been thrown out of employment, leaving 3941 at present remaining in the district thrown out of employment; and this number will be increased by about 500, who have been thrown out of employment by the stoppage, a fortnight ago, of the St. Day United Mines. Those 7380 men who have left the country have left about 20,000 behind them who were dependent upon them, and there are about 50,000 dependent upon those who are left, making altogether about 70,000 dependent upon the industry of the miners above 20 years of age. In making this computation, I have left the lead mines of Cornwall out of the calculation; what I have said applies only to the copper and tin mines in the Stannaries. Of the 26 dividend-paying mines within the Stannaries, some are making far larger returns than others; some are actually paying dividends out of reserve capital. Under the circumstances just mentioned, seeing that so large a number of mines in Cornwall are being worked at present at a loss, the adventurers generally would, I believe, be too glad to have the excuse of an additional burden in the shape of rates to get rid of the cost which they are now incurring, and a large number of mines would be closed. I have read the Bill now before the Committee, and understood it that the occupiers would be rated, and it is my impression that the effect of the passing of the Bill as it is now before us would be what I have just described.—[Witness then read several letters from several districts supporting his statements.]

By Mr. COLVILE.—Those miners who emigrated to the North of England have got employment in the collieries, and a large number are employed on the railways around London, particularly on the Metropolitan line.

By Mr. LEEMAN.—A considerable number of the best of our miners have gone to California and to the Lake Superior district of America. About 500 have gone to Australia and New Zealand.

By Mr. KENDALL.—The men who are gone are the best—young, active, self-reliant men, who have made a little money, and are able to move.

By Mr. LIDDELL.—Nearly all those who have emigrated have left their wives and families behind them, who are either receiving money from their fathers and husbands abroad, or are trusted by the small tradesmen, who hope to receive payment hereafter.

By Mr. LEEMAN.—The very fact of the large number of persons who are left now upon the rates in Cornwall and Devonshire forms a reason why in legislating now, for the first time, upon the rating of mines, full consideration should be given to the peculiarity of the property.

The committee then adjourned. ——

MONDAY, MAY 27.—Present: Mr. Percy Wyndham (in the chair), Mr. Sclater-Booth, Mr. Liddell, Lord E. Cecil, Mr. Leman, Mr. St. Aubyn, Lord G. Cavendish, Mr. Villiers, Mr. Henderson, Mr. Colvile, Mr. Kendall, Mr. Read, and Mr. Knatchbull-Hugessen.

Mr. LUMLEY (secretary of the Poor Law Board), was recalled, to explain some of his evidence on a previous day.

The CHAIRMAN: Some members of the Committee are under the impression that in your former evidence you said that under this Bill it would be possible to rate the whole of the gross produce of a mine without any deduction whatever. Did you say that?—No, certainly not; I did not mean that. I hardly think I used any words which could be so construed.

Mr. KENDALL: I asked—"What do you mean by the rest of the mine?" and you replied—"The rest of what is raised from the mine, what it would be I will not venture to say." Mr. St. Aubyn then asked—"The profits?" and you said—"Not absolutely the profits." Then I asked—"Upon the other ore?" and your answer was—"Upon the other ore, upon the value of their fixed machinery, and upon the value of their fixed buildings."——WITNESS: Yes; what I meant to express was simply the distinction between the lord and the miner. I meant to say that there should be nothing which should escape rateability; but, of course, whatever it is that is to be rated must have all reasonable deductions that were allowed under the Parochial Assessment Act. Whatever is to be expected from the mine, and is to be now made rateable, must be made rateable according to the principle laid down by the statute as long as it remains in force.

The CHAIRMAN: You said that the owners were to be rated upon the gross profits, of course meaning that deductions would be made, in order for the Assessment Committee to arrive at the accessible value?—Yes.

The CHAIRMAN: Mr. Henderson said—"At the end of the time those buildings and machinery are comparatively worthless, would it be right and fair, in your opinion, that there should be a deduction from the annual rating, in order to make some compensation for the exhaustion and for the disappearance of that capital altogether?" and you replied—"Yes; I think that would be the result of the principle of the Parochial Assessment Act, because the tenant was entitled to have a deduction equal to the amount of that which would be required to keep the things in the state of repair in which they are at the time the assessment is made; therefore, you deduct a very large sum in the first instance; it may be that throughout the term a very large sum is deducted, and at the end of the term the buildings are of little value, but the miner has had the benefit of the deduction during the whole course of his lease." I wish to know if you adhere to that answer?—WITNESS: Yes.

Mr. VILLIERS: In Cornwall meetings have been held in consequence of what the witness has been supposed to say as to rating the value of the gross annual produce, and the greatest excitement prevails?—What I meant to express was simply the difference between the lord and the miner; but, of course, whatever

is rated can claim all reasonable deductions under the Parocial Assessment Act.—Mr. KENDALL: I understood you that you thought the royalty should be rated as a royalty, and apart from that the occupier should be rated?—Yes.——What disturbed Cornwall was this, that while in other counties the occupier is rated, in Cornwall the lord would be rated as far as he was concerned, and that then there would be another rating upon the occupier, but how that assessment would be made you did not offer an opinion?—No.——Still you adhere to the opinion you then expressed, that the machinery, the land, and the occupier should all three be rated?—The machinery and the occupier will go together.——And the lord will be rated beside?—Yes. The royalty must be rated, if you continue to rate the lord. I wish to be understood all along as speaking upon the supposition that the law will be continued as it has heretofore been, by which the lord is made liable to rates in respect of his royalty, or rather, it should be said, his ore than his royalty. If that practice is to be abandoned, and the more simple course is to be adopted of rating only the occupier of the mine, then, of course, the lord is out of the question, and the miners only will be rated, and they will be rated upon the assessible value, as ascertained by the experience of a careful valuer, upon what it will let for to rent as a mine.

By Mr. READ.—Royalty must be considered as a rent.

Mr. READ: Why should it not be generally considered as the full and fair annual value that a tenant would give for a mine?—I can hardly answer that question, because in settling the royalty of a mine there are a great many matters taken into consideration, distinct from the ordinary calculations by owners of land for a simple rent. It is said in the old law books that the royalty is a "render," and "render" is the old word for rent, so that as far as the law goes it considers that it is a rent, and it has almost all the incidence of rent service. There is, however, a great deal of valuable occupation independently of what is rendered to the lord—that is to say, the adventurers' profits.——But you would not rate a farmer upon his profits!—No; but I must rate him upon the value of the occupation of his land. I suppose a farmer pays more to a landlord in the shape of rent, which is there the subject of assessment, than a miner does in the shape of a royalty to the lord.

The witness was then examined at some length by Mr. LEEMAN as to the analogy between the occupier of a farm and the occupier of a mine.

The room was cleared, and after some deliberation the Chairman was ordered to report the bill as amended to the House, and also as to the other questions of exemptions referred to the committee a special report. The document is as follows:—"The Select Committee to which the Mines, &c., Assessment Bill was referred, and which was instructed that they had power to enquire into the present exemptions from liability to local rates of different hereditaments other than those occupied for State purposes, whether arising out of statutory provisions or the decisions of courts of law, or custom, or usage, and to make provision for the abolition of all or any of such exemptions, if the Committee should deem such a course to be right, by extending the provisions of the bill referred to them, have agreed to the following special report:—

"That the Committee having regard to the probable length of the enquiry, are of opinion that it would be inexpedient to go into the other numerous exemptions from local rates on the present occasion."

The above-mentioned reports were presented by the Chairman to the House the same evening, received, and ordered to be printed.

We may, however, state that the principal amendments consist of clauses proposed by Messrs. Henderson, St. Aubyn, and Leeman. The first is a very stringent one, as to allowance for depreciation of "corpus;" the second exempting occupiers of mines within the jurisdiction of the Stannary Courts of Devon and Cornwall and the Derbyshire Courts from being assessed to local rates; and the third basing the rating of all mines solely upon the royalty.

THE SELECT COMMITTEE ON MINES.

TUESDAY.—Present, Mr. Neate (in the chair), Sir Philip de Grey Egerton, Mr. Powell, Mr. W. Orme Foster, Mr. Bruce, Gen. Dunne, and Mr. Greenall. The only witness to-day was Sir GEORGE GREY, late Secretary of State for the Home Department.

The CHAIRMAN: What is your idea of the duty of an Inspector of Mines?—WITNESS: I think the duties are specified in the instructions which they receive when they are appointed, and in those which are addressed to them from time to time by the Secretary of State. It never was contemplated that they should take any share of responsibility in the management of mines, or that mines should be worked under the superintendence of Inspectors appointed by Government. They ought to have a knowledge of different modes of working, and of the principles which govern the ventilation of mines, so as to be able with promptitude and efficiency to attend to any case in which it is alleged or believed a pit is worked in a way likely to cause danger to life. They should then point out to the manager of the pit the grounds for apprehending danger, and if their advice be not attended to, bring the case at once to the notice of the Secretary of State, and then (and it frequently has been the case) the Secretary of State communicates directly with the managers, pointing out the grave responsibility they incur by persisting to work the pit under such circumstances. There are many other points of duty, which are indicated in the instructions, but which are as numerous as they are onerous. One of their duties is to attend inquests.

The CHAIRMAN: Do you consider it part of the duty of an Inspector that he shall make himself, within a reasonable time, personally acquainted with the state of every colliery in his district?—As far as possible, no doubt it is; but collieries of a certain class require more frequent inspection and visitation than others, and I do not know that it is necessary for him to ascertain the state of those collieries which there is no reason to believe are dangerous. No doubt it is desirable that he should inform himself of the state of the mines he has to inspect, and I see that Mr. Dickinson, in his evidence, says—"There is no colliery in my district of which I do not know on what principle it is conducted."

The CHAIRMAN: The duties of the Inspectors are regulated by the Act of 1855?—Their powers, rather, I think.

The CHAIRMAN: In the 17 and 18 Vic., cap. 108, clause 7; the marginal note says—"Powers and duties of Inspectors"—and having read the clause, asked the witness if he conceived the instructions given from time to time by the Home Office carried out the apparent intentions of the Legislature in that clause?—WITNESS: I think so. It gives them power to visit at any hour, day and night, but it does not imply that they are to do so unless they think fit—something must be left to their judgment. The smallness of the number of Inspectors originally appointed shows that the idea of the Legislature was not that the Inspector should visit every colliery in his district. The number has since been doubled, but that was rather the result of an increase in the number of mines and collieries than of any new view of the duties of Inspectors. I think the clause was intended to give the Inspectors power as against the managers to enter the workings at any time.

The CHAIRMAN: Taking into consideration the great increase which has taken place in the number of collieries, do you think the present number of Inspectors sufficient to enable them to perform their duties?—That is a practical question, on which I can hardly give an opinion. I think the Inspectors themselves are best qualified to give an opinion on that point. I see that Mr. Mathews, in his evidence, says that as more pits are open it is possible that some moderate increase in the number of Inspectors, and re-arrangement of their districts, would be advisable, without putting upon them more responsibility as to controlling modes of working, which it is quite impossible for Inspectors to undertake. I do not think a large increase would be desirable. I see that of the Inspectors themselves a majority seem to think an increase unnecessary; and I know of no personal interest which they can have in objecting to an increase. Since the last increase no question of a further increase has come before me, but I see some of the working colliers entertain the idea that a great increase would be beneficial.

The CHAIRMAN: Do you not think they would prefer an increase of salary to an increase of their number?—I am not aware that they are dissatisfied with their salaries, which begin at 600*l.*, and are raised, after a time, to 700*l.*, and then, again, after a further period, to 800*l.* They have their travelling expenses besides, and are also entitled to a liberal superannuation. I believe that is quite sufficient to secure the services of the most competent men that could be obtained.

The CHAIRMAN: Suppose that after a certain number of years' service the elder ones should form a board of superintendence over the others, on the model of the local government office?—I do not see the advantage of that; it would withdraw them from the really more important duty of inspection.

The CHAIRMAN: The Inspector now has to attend when accidents occur; but supposing it was the practice for him to make more frequent inspection, would not some blame be cast upon him if the mine were in a bad state, and he had not brought it under the notice of the Secretary of State; would not that give him rather a bias in his mode of conducting the enquiry?—He does not conduct the enquiry, but it is his duty to see that a careful enquiry is made; and sometimes, in special cases, a competent person has been associated with him for that purpose. He is instructed, quite independent of the inquest, to make a careful inspection as to the cause of the accident. The associate, however, is not sent down in distrust of the Inspector, but to assist him.

The CHAIRMAN: Suppose we had two older retired Inspectors, constituting a board of superintendence, should you not think them more fit to attend to any such enquiry than the actual mining Inspector of the district?—No; I should think the latter more competent than men advanced in years, and no longer in the habit of attending to the practical details of mining.

The CHAIRMAN: What age do you consider too great for a candidate to be qualified for the Inspectorship?—I am not prepared to say. An Inspector should be a man with a sufficient practical knowledge of the working of the mines, besides that amount of scientific and literary knowledge which is now required and tested by an examination in all Civil Service appointments. He should be a man of great personal activity—of unusual powers, both of body and mind. Allow me, however, to correct a misconception. I see that in Mr. Mathews's evidence he says the Home Office reject men above 40 years of age; but that is a mistake, 40 is not mentioned; it is 45, and after that age, in cases where men are specially qualified, they would be appointed. I do not mean to say that 45 is a proper maximum, but I should be sorry to see men between 50 and 60 appointed, although even then there may be special exceptions.

The CHAIRMAN: From 25 to 45 is the rule. Do you think 25 a proper minimum? Mr. Mathews thinks it too young.—I think in practice it will be found that very young men are not appointed. The age at which men are entrusted with the management of large collieries would be a good guide as to the minimum age at which Inspectors should be appointed. There is a great difference in men, some at 25 are quite competent.

The CHAIRMAN: In what way would more frequent inspection diminish the responsibility of managers?—It is a question of degree; if Inspectors are constantly visiting a mine, and interfering with the working, recommending the adoption of this and the relinquishment of that, it is obvious that the responsibility in case of accident would be thrown upon them. The owners would say: "The Inspector did not see any danger at that particular spot, and we did not." In such a case he would not be an Inspector in the proper sense of the term, but a superintendent of mines.

The CHAIRMAN: Do you think the Inspector ought to visit his mines within a given period, (say) once in three months?—It would be a waste of time to apply such a rule to all pits. There have been repeated instances in which the Inspector has been instructed by the Home Office to pay frequent visits to particular pits where there is a likelihood of danger, and where it has not appeared that the managers have taken proper precautions, or when it has been desirable to ascertain whether, having been warned, they have taken remedial steps. Letters addressed to the Inspectors by the pitmen, even although anonymous, are always attended to, and wherever a *prima facie* case of neglect is made out it is the duty of the Inspector to enquire into all the circumstances under which such pit is worked.

The CHAIRMAN: Then you think the number ought to be increased?—A moderate increase might be necessary, but I am not prepared to say that it is. The majority of Inspectors think the present number sufficient.

The CHAIRMAN: Do you think a frequent report, stating the number of pits visited, and the number not visited, should be made?—I do not see the use of the latter, and they do report the number of visits now. I see Mr. Brough says that the Secretary of State allowed the weekly return to be discontinued. It was suggested by Mr. Clive (a member of this Committee) that that diary should be sent in weekly, and for a considerable time it was sent in; but in February, 1865, in consequence of the representations of the Inspectors, Mr. Baring directed its discontinuance, and in lieu thereof they send in a quarterly return in a certain form, which secures the information required by the Secretary of State. It is, no doubt, the duty of the Inspector to have all the boys employed in any pit before him, if he has reason to believe there is a violation of the law; but I never heard of any case in which boys under age were systematically employed. There are, no doubt, individual exceptions, and those have frequently been detected by the Inspectors.

The CHAIRMAN: Are you not aware that there is great unwillingness on the part of the men to state the age and attendance at school of their children, and that the clauses on those points are directed against the workmen as much as the employers?—It would be difficult to enforce a law of that kind against the wish of the workmen, but I have no information on the subject. No doubt the pitmen often take their boys down to help them, in which case they are not paid by the owners. Part of the borough which I represent is the large colliery parish of Pendleton, and there they have excellent schools, and the children of the miners are better educated than those of the purely agricultural districts.

The CHAIRMAN: What is your opinion as to having managers certificated, like the certificated masters of ships?—I have not had my attention drawn to that until I read it in the evidence; but I think the reasons against it, given by some of the witnesses, are very strong. The cases are quite different. The master of a ship has the sole control for some months, if on a foreign voyage, and is not subject to any superintendence; the lives of all on board are, so to speak, in his hands, and it is important that he should be a thoroughly qualified person. If a mine manager misconducts himself, he is not left to go on long without it being known and remedied. The coalowners have the greatest interest in having efficient managers, and, as far as my knowledge goes of them, as a body, I think they are efficient.

The CHAIRMAN: But does not efficiency in a manager mean the greatest amount of coal got at the least wages?—And with the greatest safety. The owners have the greatest interest in the safety of the men. I am satisfied with the results of coroners' inquests, and believe they are impartially conducted. I do not remember precisely the reasons why the alteration was made in the Act of 1860 in the mode of appointing arbitrators. I am not aware that the working of the present system has been unsatisfactory, although it does not, on the face of it, seem to be the best that might be adopted. I am in favour of stipendiary magistrates wherever there are large and densely populated districts, where disputes are likely to arise between the employers and the employed. It is difficult to get other magistrates free from a suspicion of bias, either by class or personal interests, although such a suspicion may be wholly unfounded. I believe the appointment of Inspectors has led to the most satisfactory results in diminishing the loss of life.

Mr. BRUCE: The Chairman has suggested a board of Inspectors on the model of the Local Government Office; but, as a matter of fact, that office does not exercise any control over local officers?—No; such a board would only do what is now done by the Secretary of State.

By Mr. LIDDELL.—Experience is always showing how slight improvements may be effected, but it is undesirable to be going to Parliament continually for alterations in minute details.

Mr. LIDDELL: Has not the Home Secretary now the power to increase the number of Inspectors?—Not without the sanction of the Treasury. If the Home Secretary thought such an increase necessary he would write to the Treasury, explaining his reasons for that opinion, and asking them to place the increase in the estimates, and then it would be for the House of Commons to decide. Generally in such cases, the letter is printed with the estimates, so that the House may know the reasons on which the proposal is based, and judge whether they are sufficient. I had very little personal communication with the Inspectors—the Parliamentary Under Secretary took that business on himself. When a vacancy occurred, I attended to that myself. I looked through the testimonials, and the candidates were submitted to the usual examinations; but besides that I had an arrangement with Mr. Warington Smyth to examine them as to the peculiar qualifications requisite, and to report to me.

By Mr. POWELL.—There is also an examination as to physical qualities—that is the case as to all candidates for civil service, and some persons think it is too stringent. Any defect of sight could not escape notice.

Mr. POWELL: Supposing such defects in an Inspector arose from age and long service, how would they be brought under the notice of the Secretary of State?—So many persons are interested in the efficiency of the Inspector that it would soon come to his knowledge. The workmen, for instance, have the greatest interest in it, and they are quite ready to avail themselves of opportunities of making complaints.

By the CHAIRMAN.—I do not remember any such complaint being made, or the removal of an Inspector ever taking place.

The witness then withdrew.

The Committee sat for a considerable time with closed doors, and on their rising it was understood that they will take no further evidence, and that they will meet directly after Whitsuntide to consider their report.

THE MINERAL RESOURCES OF HAYTI.

In his exploratory travels in search of mineral wealth the miner almost instinctively regards a mountain as a beacon which shall guide him toward the attainment of his object; and where a district is at once mountainous and fertile, the man of business may generally conclude that there is a fair field for commercial enterprise. The island of Hayti, or Saint Domingo, presents just such an aspect as the most fastidious could desire—it consists partly of mountains and partly of plains, and presents almost every variety of climate and temperature; a refreshing breeze almost continually blowing, giving to the whole body a calm sensation, inviting sleep, and in the high lands strengthening the nerves, and even prolonging life. The development of the commercial resources of Hayti is now to be energetically entered upon, the HAYTIAN ESTATES COFFEE AND GENERAL PLANTATION COMPANY, with a capital of 300,000*l.*, in shares of 5*l.* each, being now in course of formation for the purpose of cutting and exporting the various descriptions of valuable timber, and cultivating coffee and other products upon the rich and important estates formerly belonging to the celebrated Governor of the island, General Toussaint Louverture, and comprising about 185,000 acres of land, together with the buildings and property, as well as the coal, mineral, and other rights belonging to them.

The Gonaive coffee produced on these estates enjoys a well-merited reputation, and commands a high price in the French markets: and the company will not only give its attention to this, but will cultivate and trade in cotton, indigo, cocoa, tobacco, sugar, maize, jute, and other products, and export turpentine, resin, and palm oil, and the profits derivable from these sources can scarcely fail, regardless of any consideration of the coal and other minerals already ascertained to exist, to afford an ample fund for distribution to the shareholders. But the greater proportion of the dividends must, undoubtedly, be expected from the development of the enormous mineral riches of the estates, and it is precisely these which will be particularly attractive to the readers of the *Mining Journal*. The mountains of Saint Domingo consist generally of long chains, the two principal of which stretch the whole length of the island, and have a general direction from east to west. These contain an infinite number of mines of all sorts, whilst the high reputation which the Spanish gold mines gained for the mountains of Cibao is too well known to need comment.

The history of the mines is peculiarly interesting. In 1493 Columbus, having received a very flattering account of the mines of Cibao from Alphonso, a brave captain whom he had dispatched thither to report upon them, visited them in the following year to verify the report, and crossing from Isabella, on the chain of Monte-Christ, he discovered the plain which he called La Vega Real, the beauty of which struck him still more when seen from the mountains of Cibao. Only eight years after La Vega had become a city of importance, and sometimes 250,000 crowns were minted there during the year, the whole of the gold for which was obtained from the mines of Cibao, at a time when metallurgy was in no great perfection, and when the loss was consequently excessive. In the Spanish part of the island there are mines of iron, copper, lead, and gold, silver, and precious stones, as well as mercury, have likewise been found. In the fertile mountains of Bahoruco there are excellent indications of the existence of gold mines, and gold sand is seen in the waters. Several gold mines were also formerly worked in Azua, but they are all now absolutely abandoned. Since the tremendous earthquake in 1751, mineral waters have been noticed bubbling up in the mountains of Viajama, and the nature of these waters leads to the supposition that the mountain whence they spring is rich in sulphurous matter.

Between the rivers Nigua and Jayna lies an extensive and fertile plain, which was originally a most abundant source of riches to the colonists—the quantity of pure gold obtained from it, its sugar, cocoa, indigo, and other plantations, paid duties to a greater amount than those now paid by all the Spanish part of the island put together. Toward the source of the river Jayna were the celebrated gold mines of St. Christopher, not far from which is the parish of St. Rose, which has in its dependency the formerly rich population of Bonaventure, now reduced to a handful of individuals, whose employment is the breeding of cattle or the washing of gold sand. On the banks of the Jayna, in Gamboa and Guayabal, there is a very rich silver mine, which they had begun to work, but which was given up in consequence of eighteen negroes having been killed by a fall of earth. There is another mine of the same metal between La Croix and St. Michael. The city of Santo Domingo contains three monasteries, one of which—that of the Cordeliers—is built on a little hill, containing a mine of mercury. What a striking contrast is offered by the comparison of the present population with that of the first few years after the discovery of America—when at the beginning of the sixteenth century the rich mines of the colony, and especially the silver mine found near the capital, induced the sovereign to establish a mint at Santo Domingo, where money of the same standard as in Spain was struck.

The mines of Bonaventure and St. Rose are in the district wherein was found (not to mention many others also of remarkable size) the famous lump of gold so proudly spoken of by Spanish writers, and especially by Oviedo, who states that it weighed 3600 Spanish dollars. There was annually run at Bonaventure as much as 230,000 dollars worth of gold, and when the coat of arms was granted to the town the escutcheon chosen was—"sinople, with a golden sun through a cloud from which a shower of gold is falling." Both Bonaventure and Bonao, however, subsequently fell into decay, and in 1606 both were abandoned. The fact of the poorer inhabitants of this locality being engaged in gold washing has already been referred to, and with respect to the quality of the gold obtained it is stated that it was above 23½ carats. In 1750 preparations were made to re-work these deposits with the energy they deserve, but the death of Don Jacob Cienfugos, who directed the works, caused the enterprise to be given up.

The estates to which these descriptions refer are situated on the northern and western parts of the island, and are well watered, whilst, with regard to the commercial prospects of the enterprise, it will suffice to state that the island is governed by laws founded on the Code Napoleon, the Presidents of the republics and the natives being favourably disposed to facilitate the introduction of capital and the increased means for employment of the agricultural population to be afforded by the company; that there are great facilities for the shipment of cargoes to England, France, and America, the ports of Gonaive and the Bare de Neybe being within convenient distance, both for road transport and water carriage, from the estate; and that the terms upon which the company is to acquire the property are equitable, the vendor taking two-thirds of the purchase-money (140,000*l.*) in shares of the company. The details connected with the several mines will form the subject of another notice upon a future occasion.

THE STEAM-ENGINE—AS IT IS, AND AS IT SHOULD BE.

Last week we had submitted to us a manuscript pamphlet, of about 120 pages 8vo., compiled and composed by Mr. CRADDOCK, which is illustrative of our laws upon real original practical inventors, and shows the effects such laws produce upon the prosperity and security of the country. The author also examines in an impartial and exhaustive manner the derogative statements put forth against his claims as an inventor, and shows by unimpeachable historic evidence that, taking his patented and his unpatented discoveries and improvements in the steam-engine, and referring back to the dates when he published them to the world, and placed them in every-day practical work before the public, instead of any of his statements upon the property value of the invention, or his claims thereto, exceeding the truth, they do not come up to the actual value of the property so made, and his rightful claim as the producer of the invention. To the English people alone he shows this invention is worth nearer 30 than 20 million pounds sterling annually, and in property value and universal application it far exceeds either SAVERY'S, NEWCOMEN'S, WATT'S, or TREVETHICK'S, when compared, as theirs are, with the state of things they found in use when each first put his invention practically before the public. This author shows how easy it is upon subjects of this kind to mislead the public, by specious leaders and reviews written, to serve vested interests, and strip the inventor of reward and credit by producing *prima facie* articles, which give impressions the very opposite of those which would result from a fair statement of the case. He points attention to the fact that inventions, like farms, are known by the value of the crops they produce; where no crop is there can be no property value. He also shows that in the steam-engine the mechanical structures are to it what the house, buildings, roads, and water-courses are to the farm; but that it is in the combination of the ever-changing fluid principles that the basis of the property in the steam-engine is found, just as the land is the basis of the farm property. He then gives the true historic account of how each inventor had improved this basis before he entered the field in 1840, and how from that time, by the end of 1845, he had developed, practically applied, and published to the world, the discoveries and improvements which constitute his invention; and here we find the inventor, in self-defence, compelled thus to publish and expose in practice his invention before patenting it, and thus the reason why his patent claims are not co-extensive with his rightful claims in his productions. He then shows that, having embodied this invention in one set of mechanical structures, and illustrated and described several others, such structures could be varied with almost as much facility as the tailor can alter the cut of a coat. He shows that as HORNBLOWER and others (after WATT had practically proved the value of his separate condenser) could, and did, produce nearly as good results by so forming the exhaust-pipe as to serve as an injection condenser also; so in like manner when he (CRADDOCK) had made his discovery of the internal cooling in expansive steam-engines public, and practically neutralised it, and demonstrated by the working of his engines what could be done by the use of steam expansively in short, double, and quick-stroked direct-acting steam-engines, showing therewith and thereby that such engines would work with greater economy, even with the atmosphere for condensation, and requiring only 1 gallon of fresh supply of water per horse-power per day, than even the Cornish pumping-engine could do in its circumscribed locality, and then that the HORNBLOWERS of his day could do what they had done in WATT'S day. But as WATT had but bare justice done him by using NEWCOMEN'S, and not HORNBLOWER'S, standard of comparison, so CRADDOCK shows he has but bare justice done him by taking as the standard of comparison Mr. WOOD'S statement of coal, given in 1844, in a paper read in that year to the Society of Civil Engineers, and published by WEALE. CRADDOCK'S invention had then been in work before the public for nearly three years, and the coal by it reduced two-thirds below the best results given by Mr. WOOD, and to less than one-sixth that required by the non-condensing factory engine, which as his (CRADDOCK'S) engine was then condensing by the atmosphere, this latter is the proper one to compare with it. Mr. WOOD gives 16 lbs. of coal per horse-power for the non-condensing factory engine, 8 lbs. for the WATT engine, and 8 lbs. of coke for the locomotive engine per horse-power per hour. We will now extract from the manuscript the following paragraphs, which, as the paragraphs are numbered from 1 up to above 200, with an index indicating the subject matter of each paragraph, the reference to any point is of the most direct kind, and the reader finds he gets the result of the evidence in a single paragraph, and the evidence on which it rests in a series of paragraphs, which are clearly indicated. These remarks apply to all points of the question.

With inventions of this class (he says in paragraph 19) and that of WATT'S, there is really and truly, when the coal is reduced from 16 lbs. to 8 lbs., and from 8 lbs. to 1 lb. per horse power per hour, as little difficulty in determining who did it as there is in determining who made a certain piece of cotton goods, or built a certain house, and, as a consequence, quite as little question who *should be debited* with the credit and pecuniary recompense.

What the pioneer farmer could not do (see paragraph 21), the real comprehensive inventor does,—he produces a property basis, and places it in the City of London, and amid the most teeming populations, to reward any of the multifarious industries of the world. His is a property basis, from which men can produce, and enjoy the fruit, either on the sea or on the land, on the rivers or in the fields, in the Desert of Arabia or amid the fashion of Paris, at the ice-bound poles of the earth, if men can get there, or under the burning sun of the Equator. In short, it can be placed anywhere, as a property basis, that man can live. What other inventor ever gave the steam-engine such a basis, or opened up any approach to so wide a field for its use, by fitting it for such universal application to the service of

mankind? That his contemporaries should not recognise the almost boundless worth of his invention does not surprise the inventor; but the indications have been too plain that it has been the recognition of a large amount of worth in it that has prompted the injustice towards the inventor, which has been of the most cruel kind.

In paragraphs from 48 to 60, this author, by an exhaustive examination of the historic evidence, shows what others did and did not do prior to his entering the field in 1840, and he sums up the sequel thus:—"Paragraph 66. This inventor's basis and results embrace the following that is is not found in WATT'S basis and results. WATT'S basis did not include surface condensation, even with water, and when that was added by HALL and others, from 1834 to 1838, so lavish was WATT'S basis in its use of heat, that no appreciable economy was effected. It did not combine the high and low pressures in the same engine. It was not a direct-acting engine. It did not recognise the cause of the condensing effect of steam under expansion, and, consequently, it did not neutralise it. Consequently, speaking of it as a marine and factory expansive engine, it had extremely little practical worth. It did not retain the steam-water for the use of the boiler. Its boiler did not generate even the low pressure steam at the rate of 13¼ lbs. for 1 lb. of coal, but at the rate of 8 lbs. of steam for 1 lb. of coal. It did not produce the horse power with 1 lb. of coal per horse-power per hour, but required 8 lbs. It did not reduce the condensing water required to 80 gallons per horse-power per hour, but as in HALL'S case, with surface condensers, it required 600 gallons for a like power for a like time. It did not form a basis and provide the means by which steam of 400 lbs. pressure can be safely and economically generated, and effectively used in practice, and thus by CRADDOCK'S invention reduce the coal to even ½ lb. per horse-power per hour. It did not bring in the atmosphere as the condensing medium, and thereby secure all the advantages universally, which it could only take advantage of in the few localities where water was abundant. It could not produce the horse-power with a fresh supply of 1 gallon of water per horse-power per day, but required for the ten-hour day, according to HALL, 6000 gallons per horse-power per day. Its use was very limited, but the field in which this basis is applicable is as wide as that of the existence of man. WATT'S engine was also limited in its use by bulk and weight. But the inventor's engine, boiler, condenser, combustible, and water, as before said, may be so reduced in bulk and weight for its power, as perhaps at some future time to be found flying among the birds in the air, and still retaining greater economy than the best Cornish engine ever made, though for equal power it be reduced in weight a hundredfold, and make one hundred strokes in the time the Cornish takes to make one. Now the reader can contrast WATT'S basis with NEWCOMEN'S basis, and then he will know what to think of the *Artizan* of 1844, and of 'the cause, the truth and grandeur of which was just being generally acknowledged,' according to the *Engineer* in 1861. It may assist the reader to see why just then that acknowledgment was forthcoming, to say the inventor's patent had just then lapsed: stripped of all pecuniary reward, why should he not be of the credit also?"

In the same way, in paragraph 70, the author sums up the sequal of his sifting of evidence upon the TREVETHICK non-condensing engine. We have seen how far the WATT and the Cornish bases fell short of the basis produced by this invention, by showing what they did not contain which this basis does contain. The same course is here adopted with the TREVETHICK basis. The TREVETHICK basis does not contain condensation. It does not retain the steam-water. It does not contain the vacuum. It was not, when this inventor first put his invention to work before the public, an expansive engine, nor it never can be one but to a very limited extent. It does not combine high and low-pressure steam in the same engine. It did not get the horse-power with 1 lb. of coal per hour, but required 16 lbs. of coal per horse-power per hour. It does not render the steam-engine universally applicable, by enabling it to work with a fresh supply of water of only 1 gallon per horse-power per day; but it requires 100 gallons for the like power and time; or, as stated by WATT in paragraph 53, 160 gallons. It does not render water-tube boilers practical, as it entails deposits. It did not present the means of removing from the steam-engine the two great obstacles to the full development of the high-pressure expansive and condensing steam-engine—surface condensation, and the employment of the water-tube boiler. It did not generate 13¼ lbs. of steam for 1 lb. of coal, but only 8 lbs. of steam for 1 lb. of coal. It did not present mankind with a safe boiler, as in England and in America thousands of lives have been sacrificed by its explosions. It did not render the steam-engine capable of producing such great power with so little bulk and weight. It did not so enable it to carry itself and the elements of its power from place to place, and be applicable in all localities; though this and the preceding point are its chief recommendations, contrasted with the WATT and the Cornish engines. It did not recognise the condensing effects due to the steam itself in the expansive engine. As an expanding engine, we see in paragraph 62 what Mr. WOODS, the then best judge upon that point, said of it in 1844. Now, after this examination, what presents itself to any mind informed upon the subject, and free to be guided by the evidence of practice, and enlightened by positive science upon the question? Why, that the high-pressure expansive and condensing steam-engine upon the inventor's basis draws with it all that is good in all the other bases; this inventor's basis having removed every barrier, and brought to light all the heretofore hidden causes of failure, presents a basis founded upon the rock of practice; and by his discovery of the cause of failure in the expansive engine, it is seen the failures have arisen from our not clearly understanding the subject, and not from any real inherent clashing of sound science and practice. The consequence will be that the expansive engine upon this basis will unite all the others into itself. A very different conclusion to that of the *Artizan* of 1844, and "the cause, the truth, and grandeur of which" was present with the writer in the *Engineer* in 1861, is clearly destined to lead to such results, in spite of all human opposition. Why should the opposition of the few indefinitely defer the time the nation shall gain from 20 to 30 million pounds sterling annually, and scourge the inventor to death for making such a basis, and practically proving it for 20 years?

In paragraph 131 the author shows from FAREY'S work, page 331, that WATT could not gain more than 100 per cent. upon NEWCOMEN'S engine by his separate condenser, but before he (CRADDOCK) left his invention, in 1858, he had gained nearly 700 per cent. upon WATT'S engine as he found it in 1840, or even in 1844, and double this amount upon the then non-condensing engines with the 16 lbs. of coal per horse-power per hour, as such engines can now be made condensing, and the coal reduced from 16 lbs. to 1 lb. per horse-power per hour.

Our space will allow us to add to our extracts only paragraph 133, but by a little attention to it all readers can see the secret of this inventor's success, and they can also see what a destructive cause was at work in the double, short, and quick-stroked expansive engine:—

"The reader whose mind has been otherwise engaged than in the study of the steam-engine, in reflecting upon the hot and cold-blast set up within the steam cylinder of every such expansive steam-engine, should first recognise that the greater the degree of expansion which takes place in any one cylinder the greater becomes the cause of loss here referred to, unless the cause be neutralised. To make the subject easy of comprehension to the general reader, suppose the steam-cylinder heated to 100° above the temperature of the steam in the boiler: the steam then is a cold-blast at all parts of the stroke, and the cylinder is soon reduced the 100°. Now, the steam from the boiler begins to be hotter than the cylinder, such steam being what is called saturated steam, on the cylinder extracting heat from it on it is entering at full pressure from the boiler condenses, we will suppose, one grain by weight, the heat being in the metal, and the water on it. When the communication with the boiler is closed the steam in the cylinder rapidly expands, and as rapidly cools; thus we have a cold-blast of great density at first, and becoming more cold as the steam becomes less dense; thus the metal becomes hotter than the steam, and that which was condensed, on entering, does at different parts of the stroke take its heat again, and leaves the cylinder as cold as if it had never thus imparted heat to it. And when the communication is opened to the condenser all the steam that came from the boiler, and with it all the heat, passes to the condenser, thus leaving the metal of the cylinder colder at the end of the second stroke than it was at the end of the first stroke.

"To render the case simple, suppose the exhaust and pressure strokes as one stroke, as it is so understood by engineers, when referring to the revolution of the crank: now, the crank makes 1000 revolutions, during which time the cause of cooling is multiplied 1000 times. But it will be said how can that be, when the steam re-heats it every time by a fresh charge received from the boiler up to the boiler temperature, at least in that portion of the cylinder and piston exposed to it before cut off from the boiler. We will grant this, but mark how it re-heats it. Why, by depositing as much water as it gives up heat to the metal, the heat and water being equivalents of each other, form steam again at each stroke, and fly to the condenser at each stroke. Now, the constant cause of cooling is cumulative at each stroke; but the cylinder is at the end of each stroke as if it received no heat from the entering steam, which was temporarily condensed on entering, because it sends all such heat and water to the condenser. This cumulation goes on until we get a cylinder loaded with water, and a condenser choked with steam, that does little or no work in the expansive steam-engine, and the expansive engine becomes a loss rather than a gain; such it is often found to be, even at this day. The obvious result of the Cornish slow-stroked engine, and the increase of cylinders, in getting some power back on the impelling stroke, and filling up the tail of the indicator figure, are points for the engineer, but as they are treated of in other paragraphs, we omit them in this popular view of the question, which is intended to make it clear to all readers that such must be the result, even upon the supposition that no cold is imported into the question but that which is generated by the steam in the act of expansion in the steam cylinder; and upon the supposition, also, that every degree of heat that leaves the boiler in the steam is found in the condensing water. Of course some heat is lost by radiation and contact with other bodies besides the cold steam, but the question is here confined to the cold steam, and the action of the metal of the cylinder, to show that in it we have a cumulative cause of cold which, in such expansive engines as under notice, is more destructive of power than was NEWCOMEN'S injecting of cold water into the steam-cylinder of the ordinary engines. As WATT'S separate condenser was the chief wealth-making part of his invention, so the discovery of this cause, and its neutralisation, is a chief cause of the value of this invention, and it holds the same place in relation to the expansive engine as did WATT'S separate condenser to NEWCOMEN'S engine. Given a good farm, and a thousand ways present themselves for erecting the house, buildings, and making roads and accessories. If possible, the mechanical dress of the steam-engine admits of more easily modifying it, than in the case relating to the farm. Therefore, to be consistent, he who alters the accessories has quite as much right to claim the farm as he who does the same thing with another man's invention has to claim such invention. And be it remembered that such inventions cost more to produce and practically establish their soundness than very good farms can be purchased for, even in England."

From 1844* we have consistently held this invention to be a sound one, and one of those which mark an era in the department to which they relate. We have no reason to change that opinion, and the manuscript pamphlet from which we have made these extracts presents very much to strengthen it. It forms an appropriate appendix to the inventor's Lectures, published by Simpkin, Marshall, and Co., in 1847. The republication of those Lectures with this appendix would form a practical and useful work on the steam-engine, and that upon a branch of it which has not been very much investigated, except by this author.

* "Indeed, the principle has given a new character to the steam-engine, and one which, at a future time, may be applied to uses which the inventor never contemplated."—*Mining Journal*, June 15, 1844, page 201.

THE GREAT IRONMASTER.

"Delivered from persecution of malice and envy, here rests JOHN WILKINSON, Ironmaster, in certain hope of a better state and heavenly mansion, as promulgated by JESUS CHRIST, in whose Gospel he was a firm believer. His life was spent in action for the benefit of man, and he trusts, in some degree, to the glory of GOD."

This, written with his own hand, we have authority for stating was the inscription which JOHN WILKINSON desired should be placed upon the iron mausoleum that was to surmount his iron coffin in which, by will, he ordered that his corpse should find a resting place, in a favourite spot in the beautiful garden which he had literally chisselled out of a rock when he built himself a home at Castle Head. Who of the great ironmasters that yet survive is there that would not desire to be able truthfully so to sketch their own history? We would willingly believe that there are many of the great ironmasters' successors who could do this; and that there is no one amongst our readers who will not have perused with very great pleasure the highly interesting letter which we published on May 18 from Mr. JAMES STOCKDALE, of Newton-in-Cartmel, a gentleman whose connection with Mr. JOHN WILKINSON consists in Mr. WILLIAM WILKINSON (JOHN'S brother) having married his (Mr. STOCKDALE'S) aunt, on his father's side. Reasonably, Mr. STOCKDALE cherishes every fact in the history of JOHN WILKINSON, and preserves with care every document that has been handed down to him that in any way may illustrate JOHN WILKINSON'S life. Nor does he keep those documents, or the knowledge that he possesses, to himself. Reading the *Mining Journal* of the 13th of April last, he saw our notice of the presentation to the Corporation of Wolverhampton of the portrait of WILKINSON, who in that part of the kingdom is spoken of by many as "the founder of the South Staffordshire iron trade;" and, desiring that the Corporation should have full information of the history of the original, he at once wrote them the communication which we gave on May 18. Nor does Mr. STOCKDALE content himself with merely wishing to communicate to the Corporation what he knows relative to the subject of the letter, but, desiring that the whole iron trade should be made more than heretofore familiar with one who was so memorable an instance of the remarkable powers which, developed in their order, have done so much to lay broad the foundations of England's modern greatness, he writes in his postscript—"Perhaps the Editor of the *Mining Journal* will publish this letter." Certainly he will; and he does so with much satisfaction that the *Mining Journal* should have led Mr. STOCKDALE to give to the world a very welcome addition to all that we have hitherto learnt through the pains-taking efforts of Mr. SAMUEL SMILES.

How very encouraging to every young man who, possessed of health and genius, is now striving to establish himself in any of the thousand and one departments into which the manipulation of the useful metals is divided is the history of JOHN WILKINSON. We commend it to them. Can any picture be more interesting to such men than of the three WILKINSONS making common flat-irons from the molten metal of the blast-furnace, "carried in large ladles across the public highway to an adjoining shed, and poured into small moulds?" Then, to watch the father and sons, "of a bold, daring, and inventive turn," alternating the work of their rude foundry with the cutting away of portions of large clay-stone rocks at the rear of their house and foundry, to grow wall-fruit upon the smoothed face of the rocks. Subsequently, to see them endeavouring to utilise the rich hematite ores of Furness with the fuel with which Nature surrounded them. How greatly the Furness district of the present day is indebted to these three iron-smelting pioneers it is not easy to compute. And we can imagine how, improving upon the manufacture of their common flat-iron, they found the means of prosecuting further experiments, by the success which attended JOHN WILKINSON'S happy idea of producing box-iron, that enabled the frilled dandies of that day to be more than ever charmed with the skill of their laundresses.

Without pausing to point to the difference in the worth to mankind of the inventors of the box-iron and the fops who "dislike trade," we gather satisfaction from finding ISAAC WILKINSON ("then rather old"), as Mr. STOCKDALE writes with almost the quaintness of PEPYS, with his "clever son," JOHN WILKINSON, erecting ironworks in Staffordshire. The date of the erection of WILKINSON'S blast-furnace at Bradley is said to have been 1766 or 1767. It was the first put up in the township of Bilston. Exclusively flat-iron and box-iron makers no more, they are soon the owners of blast-furnaces and ironworks in most parts of England and Wales which were known at that time to possess the materials for the smelting of the metal. The sire dead, JOHN becomes known as the "Great Ironmaster." And well he deserved the name. After four years' efforts he succeeded in smelting iron with coal, whereby he made his Bradley furnace produce not 10 but 20 tons a week. He communicates the fact in a letter dated Oct. 11, 1772. He says, "The coal is got on my estate, and answers well." Not content with attending to and improving the production of iron—and the evidence given at the trial upon NEILSON'S patent, in 1839, was conclusive that he invented a kind of hot-blast—JOHN WILKINSON comes to the aid of WATT, who requires a cylinder bored with greater precision than it was possible to turn out with the boring machinery previously used.

At this period (early in 1775) of his history JOHN WILKINSON had amongst his other works an iron foundry at Bersham, near Chester, and had invented a new cylinder-boring machine, the merits of which far excelled all similar appliances. Thenceforward he is resorted to by WATT for bored cast-iron cylinders and for condensers; and he is found in converse with WATT at his works. The invention and perseverance of each is used to the benefit of the other. In less than 18 months after WATT applies to WILKINSON for a cylinder bored to truth, WILKINSON commencing the manufacture of wrought-iron—or as WATT, in writing to BOULTON, describes it, "is going to work in the forge way"—and not content with the old appliances, sends to WATT for a tilt-hammer. WATT describes it as "an engine to raise a stamp of 15 cwts. thirty or forty times in a minute;" and he adds, "Many of these *battering-rams* will be wanted, if they answer." The hammer was a success, and water-power is obsolete. Soon WATT is making engines for WILKINSON'S forge at Bradley, capable of working four hammers of 7 cwts. each.

But WILKINSON, not content with making iron in England and Wales, now establishes ironworks in France, and there does that which had never before been done in that country: he casts cannon in the solid, and then bores them. For this information we are indebted, through Mr. SMILES, to Mr. ARTHUR YOUNG, who records the circumstance in his "Travels in France" (4to edition, London, 1792, p. 90), and speaks of the process being unknown in France "until that well-known English manufacturer (JOHN WILKINSON) arrived." WILKINSON was in France in 1785. At Crusal, there, he erected one of WATT'S steam-engines, the first that was brought into use in that country. In a letter to WATT, dated from Crusal, Sept. 13, 1785, he says—"The engine is in operation, and the Frenchmen are delighted. It is a complete success, and the numerous visitors, among whom were Duc d'ANGOULEME, M. BERTRAND, &c., expressed their satisfaction. I wish you had been here." The Parisians were also indebted to him for the iron pipes for their water-works, for the supply of which he contracted. So highly were the Parisians satisfied with the pipes that a grand banquet was devised in WILKINSON'S honour, and it came off at the Hotel de Ville, on Jan. 14, 1786. WILKINSON returned to England in July of that year.

At about the time that he started his forge at Bradley (1784) he is found assisting the third ABRAHAM DARBY to construct the first iron bridge. Not only does he subscribe towards the undertaking, and otherwise become an active promoter of the scheme, but he also gave the company that was formed for building it the benefit of his skill and experience so soon as it was determined that the bridge should be of iron. SMILES admits that in his "Lives of the Engineers" he has attributed rather more credit to WILKINSON than he is entitled to. There is, however, one invention closely allied with iron bridges, and which has resulted in far more benefit than has been produced by them, alike to the iron trade and to the world, which belongs as exclusively to JOHN WILKINSON as does the invention of box smoothing irons. How far the idea of building boats and barges of iron was suggested to him by the part which he took in spanning the Severn at Broseley with a cast-iron bridge it is impossible to determine, but it is an interesting coincidence that in eight years after the bridge was opened to the public WILKINSON wrote from Broseley, stating that his iron boat had been launched, that it "answered all his expectations, and had convinced the unbelievers, who were 999 in 1000. It would (he added) be a nine days' wonder, and then be like Columbus's egg." Fifteen months afterwards, writing from his Bradley Ironworks, he stated that there had been two iron vessels launched in his service within the previous two months, one a canal boat, and the other a 40-ton barge for the river Severn; and he expected that the latter was then at Stourport, laden with bar-iron. "My clerk at Broseley (he says) advises me that she swims remarkably light; and exceeds even my own expectations." What the world owes to this invention alone no one can estimate. Truly JOHN WILKINSON was the "Great Ironmaster," and might well issue coins bearing his own likeness on the obverse, and on the reverse a representation of a forge, a steam-hammer, and an iron ship.

No wonder that after all his successes in the production and manipulation of iron he should have desired that his coffin should be made of that material; and that of that material his mural monument should be constructed. But, to translate the Latin passage with which Mr. STOCKDALE concludes his letter—"Thus passes away the glory of this world." JOHN WILKINSON was "of the earth earthy." And as his life's sun approached its going down, he, following the precedent set by men who had lived before him, seems to have wished to keep this momentous truth constantly in his mind. So, whilst enjoying his retreat at Lindale, and recalling in the rock-gardens he had made for himself at Castle Head the early associations connected with similar victories by father and sons in the slate-stone rocks near to the foundry in which they wrought together in casting flat-irons, JOHN WILKINSON would remind the "Great Ironmaster," by the presence of his own coffin, that as the father had died, so too the son must die. With like emotions, also, he would view the construction of the pyramidial iron mausoleum, of "20 tons weight," which was to be placed over the iron coffin when the designer of both should be enclosed within it. And we can imagine that if he had thought he should be "four times buried and three times disinterred," the persistent spirit which in the heyday of life had enabled him to surmount every obstacle that impeded the completion of his plans would have prompted him to take those steps that would have secured the execution of his wishes at the close of his life. He would have made the rocks provide him the grave he desired, even as he had twice forced them to yield him a garden.

Under the pew of Castle Head House, in the Lindale Chapel, the "Great Ironmaster" has at last found a resting place; and who will not join with us in trusting that, through that Gospel in which he was a "firm believer," he is now in blissful possession of the "better state and heavenly mansion" to which he looked forward?

ABSORPTION OF GASES BY METALS.—Prof. Odling, in a lecture on this subject, stated that platinum, in the form of wire or plate, at a low red heat, can take up and hold hydrogen gas; but palladium possesses this power in a very high degree and at a lower temperature, neither having the slightest absorbent power for oxygen or nitrogen. This power has been found to vary with the condition of the surface of the metals and the temperature. The pressure required to condense the quantity of gas extracted from these metals in some cases was calculated as equal to 15,000 atmospheres. Some of the hydrogen was extracted by means of Sprengel's air-pump, and proved to possess its ordinary chemical characters. Copper and gold when heated also absorb and retain hydrogen; but silver especially selects oxygen. Iron at a red heat can absorb both hydrogen and carbonic oxide, which facts were shown to have an important bearing on the conversion of iron into steel. In relation to this subject, Prof. Odling actually extracted hydrogen from a piece of the Lenarto meteoric iron in the presence of his audience. After referring to the analysis of this iron as 85·68 hydrogen, 4·46 carbonic oxide, and 9·86 nitrogen, and to that of ordinary iron as 58 carbonic oxids, 21 hydrogen, and 11 nitrogen, he added that, as hydrogen has been recognised in the spectrum analysis of the light of the fixed stars by Huggins and Miller, and in a numerous class of which Alpha Lyræ is the type, the iron of Lenarto had, no doubt, come from an atmosphere in which hydrogen gas greatly prevailed. We may, therefore, said he, look upon this meteorite as holding imprisoned within it and bearing to us the hydrogen of the stars. It has been found difficult to impregnate malleable iron with more than half its volume of hydrogen gas under the pressure of our atmosphere. Now, the meteoric iron gives off, without being fully exhausted, about six times that amount. The inference, therefore, is that the meteor has been extruded from a dense atmosphere of hydrogen, for which we must look beyond the light cometary matter floating within the limits of the solar system. In regard to the nature of the phenomena connected with the absorption and occlusion of gases by metals, Prof. Odling referred to and illustrated the general proposition of Faraday, in 1823, that a gas is nothing else than the vapour of a volatile liquid at a temperature considerably above the boiling point of the liquid; and after showing by experiments the absorbent powers of colloid substances (such as white of egg) for gases, he expressed his opinion that metals also possess a certain degree of porosity, and thus resemble colloid substances, being more accessible to liquids than gases, which latter undergo the process of liquefaction previous to absorption. Hence a peculiar dialytic action also resides in metallic septa. Prof. Odling concluded with remarks on the importance and extensive influence of these researches both on the abstract sciences and on the arts of life.

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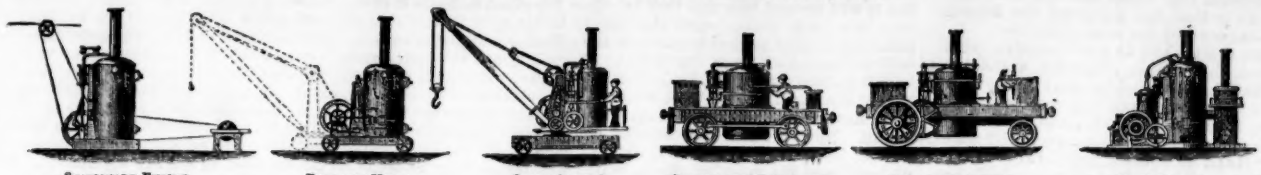

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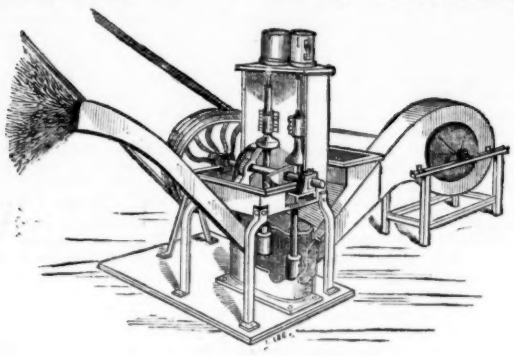

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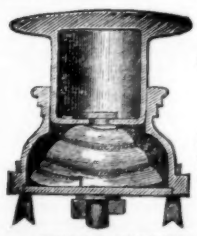

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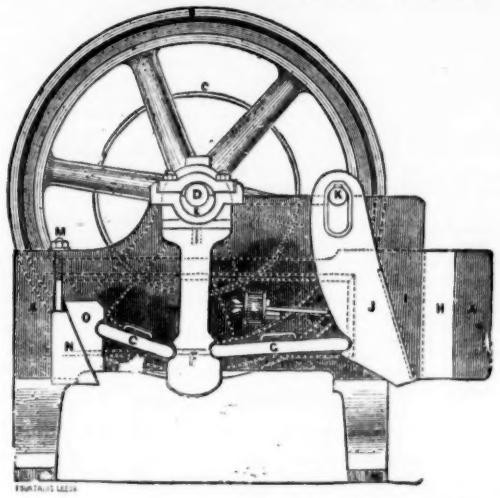

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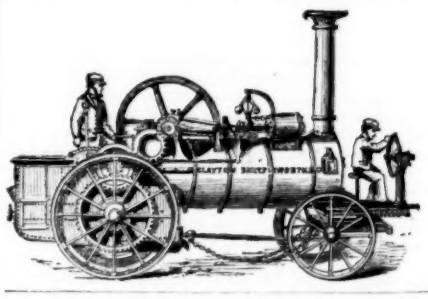

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